

Shoreline Dynamics of Jekyll Island (1888-2014)

Abstract:

Jekyll Island is one of Georgia's twelve barrier islands, located just southeast of the city of Brunswick in South Georgia. The island is bounded by St. Simons Sound to the north, Jekyll Creek and Fancy Bluff Creek to the west, Jekyll Sound to the south, and the Atlantic Ocean to the east. This study examines Jekyll Island's northern, eastern, and southern shorelines from 1888 to 2014, with the goal of gauging changes in shoreline to quantify the effects of anthropogenic developments. The types of developments considered are those that would directly influence the transport of sediments to or from Jekyll's shorelines and can therefore be linked to trends in shoreline erosion or accretion. The damming of the Savannah, Oconee, and Ocmulgee Rivers and the installation of the "Johnson Rocks" revetment on the island meet the criteria and are the major developments taken into account by this study. Shoreline polylines, based off georeferenced digital orthoimagery, historical charts, and GPS data from the study period, were created using ESRI's ArcGIS software and the USGS Digital Shoreline Analysis System (DSAS) was then used to calculate statistics of shoreline change. The DSAS statistics generated for this study include an End Point Rate (EPR), Linear Regression Rate (LRR), and Weighted Linear Regression (WLR). The EPR is restricted to the change between the earliest and latest shorelines divided by the elapsed time, without error consideration. The LRR uses all available shoreline data to calculate a line in a best-fit model for erosion/accretion rates; WLR does the same, while also taking into account the error associated with each set of shoreline data. The use of these models to evaluate shoreline dynamics in the context of the selected anthropogenic developments provides insight into the impact human activity has on Jekyll Island and other barrier islands.